

***STATISTICS OF VERTICAL VELOCITY AND DROP SIZE DISTRIBUTION
PARAMETERS IN LARGE-SCALE PRECIPITATION***

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ABSTRACT

As traditionally viewed from a weather radar perspective, large-scale precipitation is often characterized by prominent melting-layer signatures (radar bright band) and gentle-varying radar reflectivity gradients beneath. When observed, these same sorts of radar features are often indirectly associated with the presence of weak (downward) vertical air motions and slow-evolving drop size distribution parameters. Aircraft penetrations, wind profiler measurements, and other in situ instrumentation have been previously deployed to validate such beliefs; however, these approaches have several known limitations including space/time sampling and accuracy issues. Here, this study employs a well-established, novel technique to retrieve high-resolution, high-quality vertical air motion and drop size distribution parameters in large-scale precipitation fields. This cloud-radar-based technique capitalizes on non-Rayleigh backscattering signatures at 94 GHz for an extended data set. The existing data set includes a diverse sampling from long-term deployments in the Southern Great Plains (SGP) region, as well as ARM Mobile Facility (AMF) deployments in the regions of Niamey, Niger (NIM) and Germany's Black Forest (FKB). These data are classified with respect to location and surface rainfall intensity. Mean and standard deviations of the retrieved distributions of vertical air motion are used to test the assumption of near-zero mean vertical air motion in large-scale precipitation and to document the occurrence of large vertical air motion magnitudes. Decorrelations in time and height of the retrieved drop size distribution parameters (e.g., slope, shape) are introduced to study the scales of microphysical variability. The high-resolution data set is also re-sampled to coarser spatial and temporal resolutions so as to assess physical process (sorting) noise and the sub-sampling volume variability of these parameters as compared to other ground-based (e.g. NexRad, disdrometer) and satellite-based (e.g., TRMM/GPM) efforts.

This poster will be displayed at ASR Science Team Meeting.

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